Soft Computing Journal

Special Issue on Deep Learning: Emerging Trends, Applications and Research Challenges

Call for Papers

Machine learning is to design and analyze algorithms that allow computers to "learn" automatically, and allows machines to establish rules from automatically analyzing data and using them to predict unknown data. Traditional machine learning approach is difficult to meet the needs of Internet of Things (IoT) only through its outdated process starting from problem definition, appropriate information collection, and ending with model development and results verification. But however, recent scenario has dramatically changed due to the development of artificial intelligence (AI) and high-speed computing performance. Therefore, deep learning is a good example that breaks the limits of machine learning through feature engineering and gives astonishingly superior performance. It makes a number of extremely complex applications possible.

Machine learning has been applied to solve complex problems in human society for years, and the success of machine learning is because of the support of computing capabilities as well as the sensing technology. An evolution of artificial intelligence and data-driven approaches will soon cause considerable impacts to the field. Search engines, image recognition, biometrics, speech and handwriting recognition, natural language processing, and even medical diagnostics and financial credit ratings are all common examples. It is clear that many challenges will be brought to publics as the artificial intelligence infiltrates into our world, and more specifically, our lives.

Deep learning has been more mature in the field of supervised learning, but other areas of machine learning have just started, especially for the areas of unsupervised learning and reinforcement learning. Deep Learning has very good performance in speech recognition and image recognition. Two common models, Convolutional Neural Network (CNN) and Recurrent Neural Network (RNN), are best instances. However, applying deep learning to solve problems will encounter some challenges. In order to have good performance, deep learning algorithms require a large and diverse range of data, and a large number of parameters need to be tuned. Furthermore, well-trained deep learning model tend to have overfitting problems, and not easily applied in other areas. In addition, the training process of deep learning is still a black box, and researchers have a hard time understanding how they learning and how they deduce conclusions.

Therefore, in order to boost performance and transparency of deep learning models and to bring them actually to a level of high practical usage in real-world applications and facilities, this special issue places a special attention i.) on the (complexity) reduction of parameters in deep-learning models, ii.) an enhanced interpretation and reasoning methods for explaining hidden components in deep learning models as well as for gaining a better understanding of the outputs of deep learning models (=> increasing acceptability for company experts and users) and iii) on methods for incrementally self-adapting and evolving deep learning models, where not only weight parameters may be recursively updated, but also internal structures may be evolved and

pruned on the fly based on current changes and drift intensity present in the system. Furthermore, new deep learning methods in combination with renowned, widely-used architectures, but also developed for soft computing and artificial intelligence environments where it has been not considered so far (e.g., deep learning SVMs or deep learning fuzzy systems are hardly existing) are also warmly welcomed. So are new emerging applications and new developments of established applications of deep learning approaches, with specific emphasis in the fields of big data, internet of things, social media data mining, web applications.

Thus, this special issue aims to bring together various research and development achievements in exploring techniques, applications, and challenges that face the evolution of artificial intelligence in the context deep learning. Interested topics include, but not limited to:

Topics

- **Methodologies, and Techniques**
  - New methods for Artificial Neural Networks in combination with Deep Learning
  - New learning methods for established deep learning architectures
  - Faster and more robust methods for learning of deep models
  - Methods for non-established deep learning models (deep SVMs, deep fuzzy models, deep clustering techniques, …)
  - Complexity Reduction in and Transformation of Deep Learning Models
  - Interpretability Aspects for a better Understanding of Deep Learning Models
  - Reasoning of Input-Output Behavior of Deep Learning Models (toward Understanding their Predictions)
  - Deep Learning Classifiers combined with Active Learning
  - Evolutionary–based optimization and tuning of deep learning models
  - Hybrid learning schemes (deterministic with heuristics-based, memetic)
  - Incremental learning methods for self-adaptive deep models
  - Evolving techniques for deep learning systems (expanding and pruning layers, components etc. on the fly)
  - Transfer learning for deep learning systems
- **Applications**
  - Cloud and Fog Computing in AI
  - Big Data Analysis
  - Context-Awareness and Intelligent Environment Application
  - Financial Engineering and Time Series Forecasting and Analysis
  - FinTech Application
  - Innovative Machine-Learning Applications
  - Intelligent E-Learning & Tutoring
  - Intelligent Human-Computer Interaction
  - IoT Application
  - Smart Healthcare
  - Social Computing
  - Biological Computing
  - Smart Living and Smart Cities
  - Information Security
  - Natural Language Processing

Important dates

Submission due: 31 January, 2019
Notification of final acceptance: 31 July, 2019
Final papers: 31 August, 2019

Submission

Submissions to the special issue will be screened by the Special Issue Editors to insure that they conform to the quality standards of ***Soft Computing Journal***. Papers that do not pass this initial screening will be immediately returned to the authors. Reviewers will apply those standards in forming recommendations for acceptance, revision, or rejection. A maximum of two revisions will be invited. Papers should be formatted with ***Soft Computing Journal*** style (https://www.springer.com/engineering/computational+intelligence+and+complexity/journal/500#). The submission deadline is **January 31, 2019**. ***The prospective contributors should submit their papers directly to the online submission system*** (https://www.editorialmanager.com/soco/default.aspx). In addition, **Authors please choose the Special Issue (Deep Learning: Emerging Trends, Applications and Research Challenges) in the online submission.**

Related Past Events by Co-Editors

- Special Issue on **Anticipatory Computing: Crowd Intelligence from Social Network and Big Data**, *Computers in Human Behavior*, 2017.
- Special Issue on **Human behavior analysis for library and information science**, *Library Hi Tech*, Vol.35, No.4, 2017.
- Special Issue on **Big Data and Situation-aware Technology for Smarter Healthcare**, *Journal of Medical and Biological Engineering*, 2017.
- Special Issue on **Data Stream Mining and Soft Computing Applications**, *Applied Soft Computing*, 2017.
- Special Issue on **Smart Space Technology Innovations**, *Library Hi Tech*, Vol.31, No.2, 2013.
- Special Issue on **Online Fuzzy Machine Learning and Data Mining in** *Information Sciences* (Elsevier), 2013
- Special Issue on **Learning in nonstationary and evolving environments** in *IEEE Transactions on Neural Networks and Learning Systems* (IEEE press), 2014
- Special Issue on **Hybrid and Ensemble Techniques in Soft Computing'**, *Soft Computing* (Springer), 2014
- Special Issue on **Evolving Soft Computing Techniques and Applications**, *Applied Soft Computing* (Elsevier), 2014
- Special Issue on **Information Fusion in Smart Living Technology Innovations**, *Information Fusion* (Elsevier), 2015
- Special Issue on **Smart Living in Healthcare and Innovations**, *Journal of Medical Systems* (Springer), 2015

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